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| 09/212,726      | 12/15/1998  | KLAUS F. SCHUEGRAF   | M122-1098           | 7984             |

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EXAMINER

KIELIN, ERIK J

ART UNIT PAPER NUMBER

2813

DATE MAILED: 11/04/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/212,726

Applicant(s)

SCHUEGRAF, KLAUS F.

Examiner

Erik Kielin

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 17 September 2002.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 53-67 is/are pending in the application.
- 4a) Of the above claim(s) 53-59 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 60-67 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 December 1998 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 21. 6) ☐ Other: \_\_\_\_\_

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## DETAILED ACTION

### *Election/Restrictions*

1. Cancellation of all previously pending claims is acknowledged.
2. Newly submitted claims 53-59 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons:

This application contains claims directed to the following patentably distinct species of the claimed invention:

I. An embodiment wherein the  $H_2O$  and/or  $H_2O_2$  are mixed with an organic silicon precursor prior to introduction into the CVD reactor, as disclosed in the specification at p. 11, first paragraph, and Fig. 3. (In the interest of customer service, claims 53-59 appear to read-on this species.)

II. An embodiment wherein specifically  $H_2O_2$  and the any silicon precursor are fed into the CVD reactor separately, as disclosed in the specification at p. 11, line 21 to p. 12, end, and Fig. 4. (In the interest of customer service, claims 60-67 appear to read on this species.)

Currently, no claim is generic.

The claims reading on species II have been examined in the Office action filed 19 April 2002 and is considered the originally presented invention. Since Applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 53-59 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

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***Drawings***

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the wafer gap to susceptor spacing distance of about 230 mils must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claim 63 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification does not appear to have support for the limitation that the gaseous H<sub>2</sub>O<sub>2</sub> and gaseous silicon precursor are combined prior to feeding into the chemical vapor deposition reactor. While Examiner acknowledges that Applicant has indicated the this new claim has support from the specification at p. 10, lines 3-18 (as has been indicated by Applicant in the section entitled "REMARKS" on p. 6 of Paper No. 20, filed 17 September

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2002) this section explicitly indicates that the  $H_2O$  or  $H_2O_2$  are mixed with the organic silicon precursor in liquid form prior to conversion to the gas phase mixture. Accordingly, there exists no support at this location for mixing gaseous forms of each precursor prior to introduction into the CVD reactor. Rather there exists only support for mixing liquid precursors and then converting the mixed liquid precursor into a gaseous mixture.

***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 60-63, 65-67 are rejected under 35 U.S.C. 102(b) as being anticipated by US 5,314,724 (Tsukune et al.).

**Tsukune** discloses a semiconductor processing method of depositing  $SiO_2$  comprising, providing a substrate **18** within a chemical vapor deposition (CVD) reactor (Fig. 13); feeding a gaseous silicon precursor into the CVD reactor (Fig. 5B; col. 8, lines 41-54); feeding gaseous  $H_2O_2$  into the CVD reactor (col. 8, lines 5-6); and utilizing the silicon precursor, depositing a layer of  $SiO_2$  over a surface of the substrate at a rate of 7000 Å per minute (Figs. 5B and 11).

Regarding claim 61, **Tsukune** indicates that the ratio of the silicon precursor (TEOS or HMDS) and the  $H_2O_2$  are controlled by the gaseous flow rates of each, which necessarily means

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that the gaseous precursors are “independently” fed into the CVD reactor; otherwise, the ratio could not be controlled by the flow rates. (See col. 8, lines 36-54.)

Regarding claim 62, the precursors are necessarily fed into the CVD reactor simultaneously; otherwise, they could not react with each other to form SiO<sub>2</sub>, contrary to the explicit teaching in **Tsukune**.

Regarding claim 63, **Tsukune** shows that the gaseous precursors are combined prior to reaching the reactor in Fig. 13, wherein the gases mix in the electrode 15 (col. 18, lines 20-29).

Regarding claim 65, **Tsukune** teaches that the spacing between the *electrodes* is 6 mm to 25 mm. 6 mm equals 236 mils, which is “about 230 mils.” Moreover, since the spacing as instantly claimed is the distance between the *wafer* and the electrode, in **Tsukune** the distance is 6 mm to 25 mm minus the thickness of the wafer. And since the wafer thickness is at least 6 mils, which is only 150 μm --less thick than any commercially available wafer-- the distance between the wafer and the electrode in **Tsukune** falls within the range presently claimed of about 230 mils, and therefore anticipates about 230 mils. (See MPEP 2131.03.)

Regarding claim 66, the substrate is shown to have a high aspect ratio (Figs. 9A-9D, 10, 14A-15B, 17A-18F) and the SiO<sub>2</sub> is conformally deposited, by definition, since the SiO<sub>2</sub> film “conforms” to the surface.

Regarding claim 67, the gaseous precursor may be at least TEOS.

### ***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claim 64 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Tsukune**.

**Tsukune** does not explicitly indicate that both  $H_2O_2$  and  $H_2O$  are fed into the reaction chamber. **Tsukune** does, however, state at col. 8, first paragraph,

“The compound containing H and OH is a compound which generates H and OH radicals, or H and OH ions, upon being excited. The compound is preferably one which generates no radicals or ions other than H and OH radicals or ions. Therefore,  $H_2O$  and  $H_2O_2$  (hydrogen peroxide) are preferred. However, note that the occurrence of radicals or ions other than H and OH radicals or ions is not excluded from the present invention.”

In the absence of some unexpected result, the combination of  $H_2O$  and  $H_2O_2$  is obvious because the only requirement in **Tsukune** is that the gas decomposes under plasma conditions to form H and OH which  $H_2O$  and  $H_2O_2$  would necessarily do according to the express teachings of **Tsukune**. It would have been obvious for one of ordinary skill in the art, at the time of the invention to use the mixture, because **Tsukune** indicates that the plasma-excited gas contain only H and OH and that both  $H_2O$  and  $H_2O_2$  do this and since the combination would appear to work just as well as in the formation of H and OH as either of  $H_2O$  and  $H_2O_2$  alone. One of ordinary skill would be especially motivated to use the mixture of  $H_2O$  and  $H_2O_2$  in order to gain even greater control over the H to OH ratio and therefore would have another degree of control over the deposition process. Moreover, Applicant has provided no evidence of record to indicate that the mixture provides some unappreciated benefit or unexpected result.

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11. Claim 64 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Tsukune** in view of US 5,710,079 (**Sukharev**).

If it is thought for some reason that **Tsukune** does not make obvious the combination of  $H_2O_2$  and  $H_2O$ , then this may be a difference.

**Sukharev** discloses a CVD method of depositing  $SiO_2$  on a substrate using a mixture of  $H_2O_2$  and  $H_2O$  along with a silicon precursor TEOS, just as in **Tsukune** (Fig. 2; col. 2, lines 33-41; col. 3, line 50 to col. 4, line 13). It would have been obvious for one of ordinary skill in the art, at the time of the invention to use the combination of both  $H_2O$  and  $H_2O_2$  in the invention of **Tsukune**, as taught by **Sukharev**, as a matter of design choice since it would appear that the combination would work just as well as either alone and because **Sukharev** teaches that the combination of both  $H_2O$  and  $H_2O_2$  is known to be used in a CVD process to deposit  $SiO_2$ .

### *Response to Arguments*

12. No arguments have been presented since the all previously pending claims have been canceled.

### *Conclusion*

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO**



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MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

14. Any inquiry concerning this communication from examiner should be directed to Erik Kielin whose telephone number is (703) 306-5980 and e-mail address is erik.kielin@uspto.gov. The examiner can normally be reached by telephone on Monday through Thursday 9:00 AM until 7:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached at (703) 308-4940 or by e-mail at carl.whitehead@uspto.gov. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

*EK*

EK

October 21, 2002

*Carl Whitehead, Jr.*  
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